# USER-MANUAL
# Tamson Vacuum System

**Tamson Instruments bv**

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# 1 SAFETY AND WARNINGS

Make sure before installing or operating the equipment to read and understand all instructions and safety precautions listed in this manual. If there are any questions concerning the operation of the equipment or about the information given in this manual please contact your local dealer or our sales department first.

Performance of installation, operation, or maintenance other than those described in this manual may result in a hazardous situation and may void the manufacturer's warranty.

Never operate equipment that is not correctly installed. Unqualified personnel must not operate the equipment. Avoid damage to the equipment, or its accessories, caused by incorrect operation.

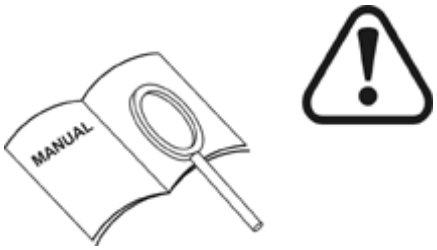
Important:
- When performing service, maintenance or moving the apparatus, always disconnect the apparatus at the main's socket,
- Proper skilled and trained personnel are only allowed to operate this equipment,
- Take notice of warning labels and never remove them,
- Refer service and repairs to qualified technician,
- If a problem persists, call your supplier or Tamson Instruments b.v.

# 2 WARRANTY

Tamson Instruments b.v. warrants that all their manufactured equipment is free from defects in material and workmanship, preventing the machine from normal operation. Tamson Instruments b.v does not warranty that the equipment is fit for any other use than stated in this manual. The manufacturer can only be held responsible for the security, reliability and performance of the equipment, when operated in accordance with the operating instructions, extensions, adjustments, changes and/or if repair is performed by Tamson Instruments b.v. or authorized persons only. This warranty is limited to one year from the date of invoicing. All equipment and materials are subject to standard production tolerances and variations.

# 3 PRECAUTIONS AND HAZARDS

**Before attempting to operate the bath read all parts of this manual carefully to insure smooth operation and avoid damage to the equipment or its accessories.**




**READ CAREFULLY**

If a malfunction occurs, consult section Trouble shooting page 14 at the end of this manual.
If problem persists, call your supplier or Tamson Instruments bv. Never operate the equipment if not correctly installed. The equipment must be operated only by qualified personnel. Avoid damage to the equipment or its accessories through incorrect operation.

# 4 Set-up

## 4.1 System Application

The TVS is used in combination with a viscometer bath. The Manifold 00T0941 has specifically been designed to fit the TV4000MKII. As indicated on the picture the vacuum pump is connected via a 4 position manifold to a maximum of 4 viscometers.

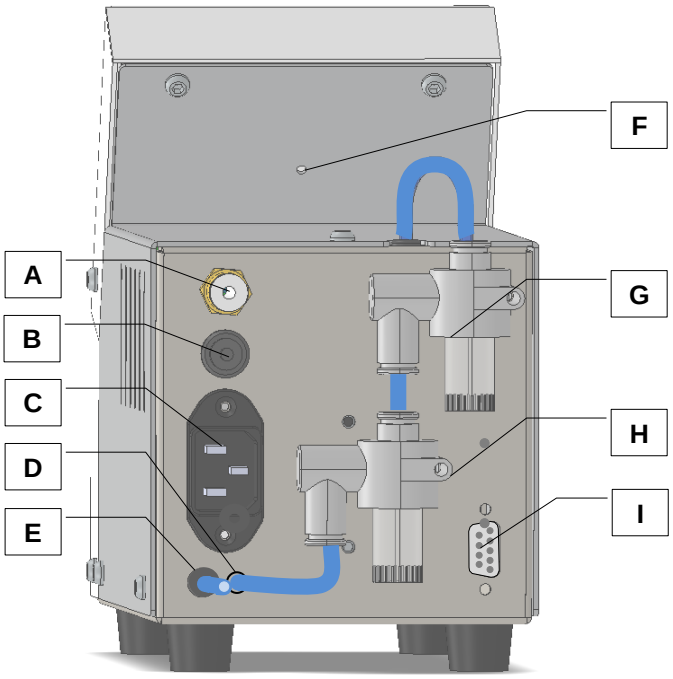
The pressure can be set in small steps offering a resolution of 1 digit (mBar, PSI or mmHg).

The Vacuum pump especially has been designed for measuring viscosity of bitumen (ASTM D2171 – IP 22 – EN 12596 – AASHTOT202). The system also can be supplied for manual viscosity testing and conforming to D445 and IP 71 and ISO 3104.

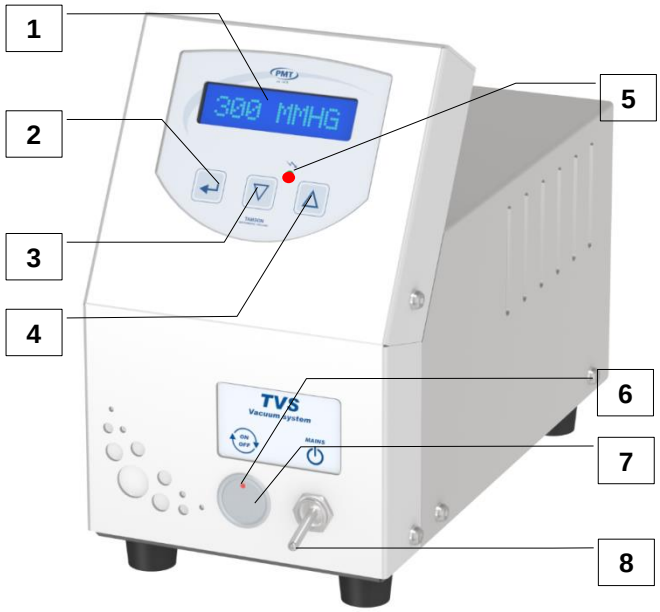
For low viscosity the vacuum can be reduce to just a few mBar. Sucktion of the sample fluid can be extremely well controlled and this prevents air bubbles in the sample. Air bubbles are a serious cause for measuring error. By using controlled vacuum this completely rules out this error.

## 5 What is what

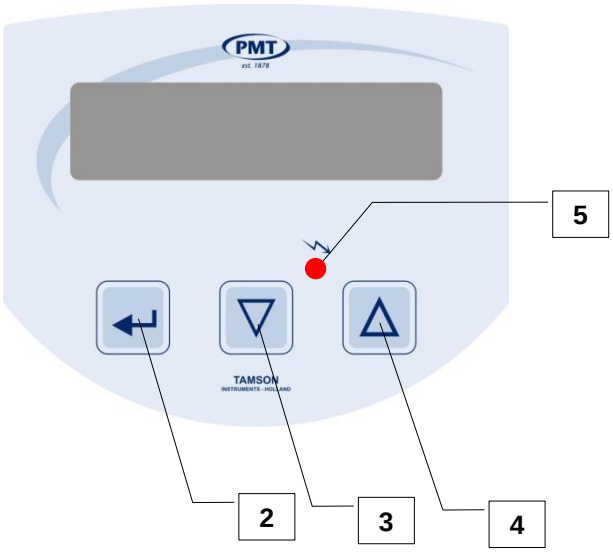
| Item | Description | remark |
|---|---|---|
| A | Vacuum inlet | Connect to manifold |
| B | Motorfuse | |
| C | Mains entry | 85 .. 230V (5-~60Hz) in |
| D | Connection | To vacuum trap |
| E | Outlet | “+” pressure out |
| F | Hole | Press for calibration |
| G | Vacuum trap | “I“ |
| H | Vacuum trap | “II“ |
| I | RS232 | Optional |




| Item | Description | remark |
|---|---|---|
| 1 | Display | |
| 2 | Key “enter” | |
| 3 | Key “down” | |
| 4 | Key “up” | |
| 5 | LED “set” | Vacuum set to memory |
| 6 | LED Motor | Pump stopped/running |
| 7 | Switch pump | |
| 8 | Unit on/off | |
| 9 | Fluid trap | optional |



## 6 Operation




Switch the vacuum pump on using the on/off button (7).

The pump will start and vacuum will be generated at connector (A).

When the pump is switched off (7) the pump motor will switch off and vacuum is released.

Only when the pump is running the vacuum can be set using the up(4) and down(3) buttons. Press the button long for larger steps, press short for smaller steps.

Once the setting of the vacuum is altered, the displays shows alternating “Conf. Sp” [Enter]. This indicates that the feedback system of the pump needs this new vacuum value to be confrmed. This can be done by pressing the “enter” key (2). The new vacuum set point is now programmed into memory (Eeprom). After switching off, this new value will be stored.

Ensure yourself that correct set-point is set by switching the pump off and on again (7). Repeat the procedure if the set point value deviates slightly. The cause for this is that with a perfectly tight system it is difficult to lower the set point as vacuum is not released. It is easier to increase the value using the up key than lowering the value using the down key. This is the cause of using an internal feedback system and well closed system.

## 7 Calibration

Span and zero can be calibrated easily.

**Before going into calibration mode:**

Connect a calibrated pressure meter to the suction connector (A).
Activate the pump (7) and set the vacuum set-point to the highest value i.e. 300 mmHg using (3) and (4). Press enter(2) to program the Set-Point
Check that calibrated pressure meter has same dimension as the TVS i.e. mmHg on the TVS and the calibrated vacuum meter. Switch off the pump (7)

The calibration mode can now be selected by using a paper clip or small pin to press the button located behind the hole indicated with (6).

## 7.1 Zero

Start the procedure by calibrating the zero pressure. The display indicates “Cal. Zero”. Press up(4) and down(3) to set the value nearest to 0. The most right value (around 400) indicates the digital to analog value from the controller. This is an indicator value and can be used for error solving and service. When the displayed value is set with up and down keys, **press enter** to store the calibrated zero value into memory. The display will shortly show “strd”. The zero now is calibrated.

Press (6) again

## 7.2 Span

The display now indicates “Cal. Span”. Start the pump. Use the up(4) and down(3) button to match the reading from the TVS against the calibrated vacuum meter. The most right value indicates the digital to analog value from the controller. This is an indicator value and can be used for error solving and service. **Press enter** to store the calibrated span value into memory. The display will shortly show “strd”. The span is now calibrated.

Press (6) again.

## 7.3 Dimension

The display shows readout. Use the up(4) and down(3) button to switch dimension to:
mmHg
mBar
hPa
PSI

**Press enter** to store the readout into memory.

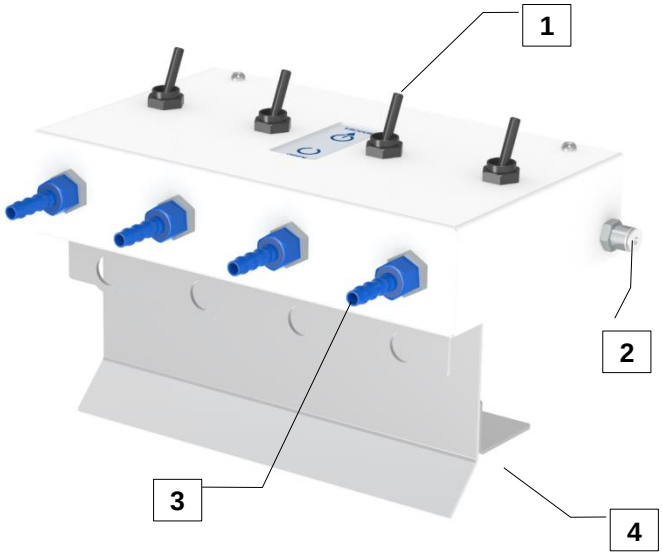
Press (6) again

The display is in operation mode again.

## 7.4 Note

Pressing (6) without using “enter” (2) will not change the calibration, so not using “enter” will not store the changed values! Changing the dimension will not change the zero or span as the vacuum readout is calculated from the internal analog to digital converter value

## 8 Manifold




| Item | Description | Remark |
|---|---|---|
| 1 | Toggle switch (4x) | To front is open |
| 2 | Connector 4mm | To TVS |
| 3 | Hose connector (4x) | To viscometer tube |
| 4 | Mounting holes | |

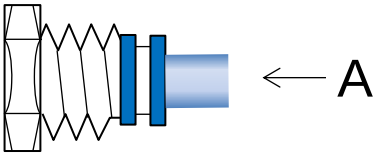
When the toggle switch is backwards, vacuum is applied to the hose connector(3). When the toggle switch is positioned towards the hose connector the connector (3) is atmosperical.

As an option other toggle switches can be mounted. These offer vacuum (backwards) or closed when positioned to the front.

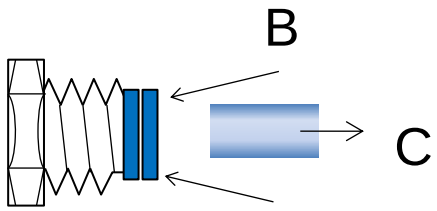
### 8.1 Quick release

The Manifold is connected to the vacuum system with a 4mm poly urethane hose. A quick release system combines ensures operation with a simple connection.

To connect simply press the hose into the connector (2)



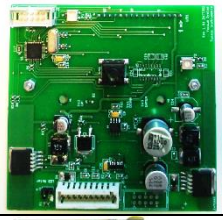
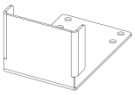

To unconnect press(B) the connector (2) and pull the hose out(C)

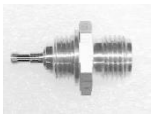


## 9 Technical details

| Specification | | |
|---|---|---|
| **Dimension** | | Dimension |
| Length | 270 | mm |
| Width | 126 | mm |
| Height | 205 | mm |
| Weight | 2,5 | Kg |
| Mains | 85 .. 264 | Volt |
| | 47 .. 63 | Hz |
| Consumption | 20 | Watt |
| Range | 1 .. 340 | mmHg |
| Linearity | ± < 0,5 | % F.S. |
| Accuracy of control* | ± 0,5 | mmHg |
| Connector PolyProp. hose | 4 - 2,5 | mm outer/inner dimension |

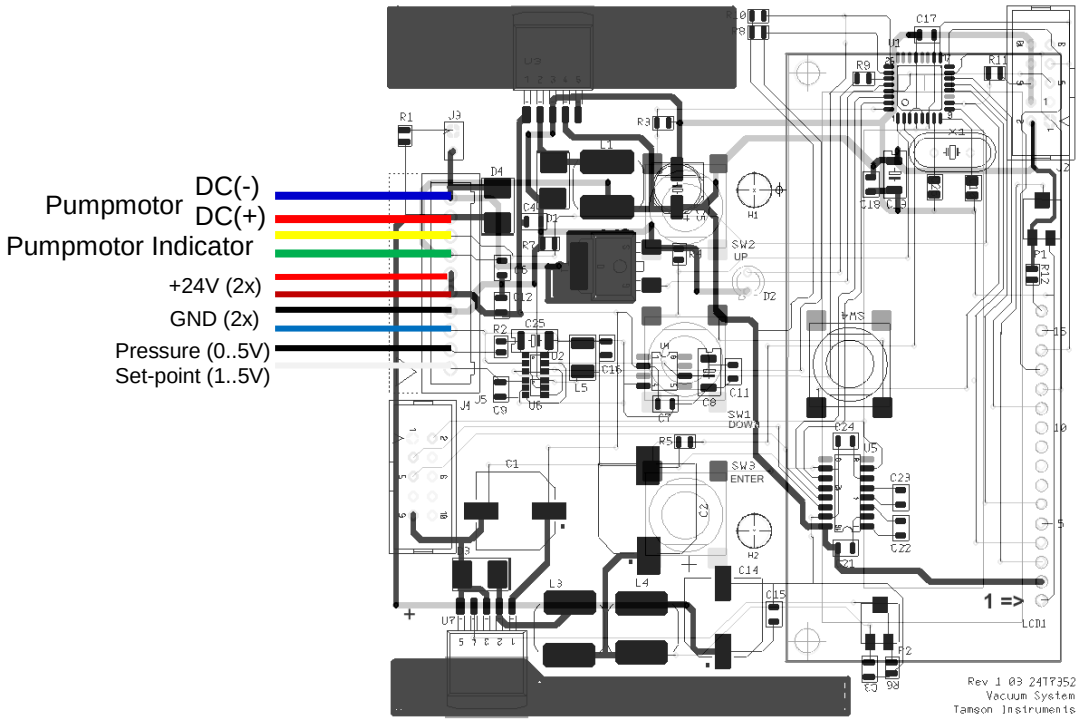
## 10 Spareparts

| Tamson Vacuum System | | | |
|---|---|---|---|
| Item | Part number | Description | Remark |
| | 06T0523 | Microcontroller board with keys and display |  |
| | 11T0030 | Pump with motor | |
| | 28T4504 | Quick connector 4mm hose/4mm hose | |
| | 28T4501 | Quick connector 4mm hose/1/4” | |
| | 28T4126 | Replacement filter (10pcs per pack) | SMC – 1-34S-A |
| | 28T4127 | Filter body | SMC-ZFB100-4 |
| | 20T4099 | Vacuum relais | |
| | 13T8030 | Fluid trap bracket |  |
| | 02T0230 | Fluid trap flask complete:<br>- Glass Jar 08T0130<br>- Cap(red) 08T0140<br>- Cover with 2 hose connections<br>- O-Ring | |

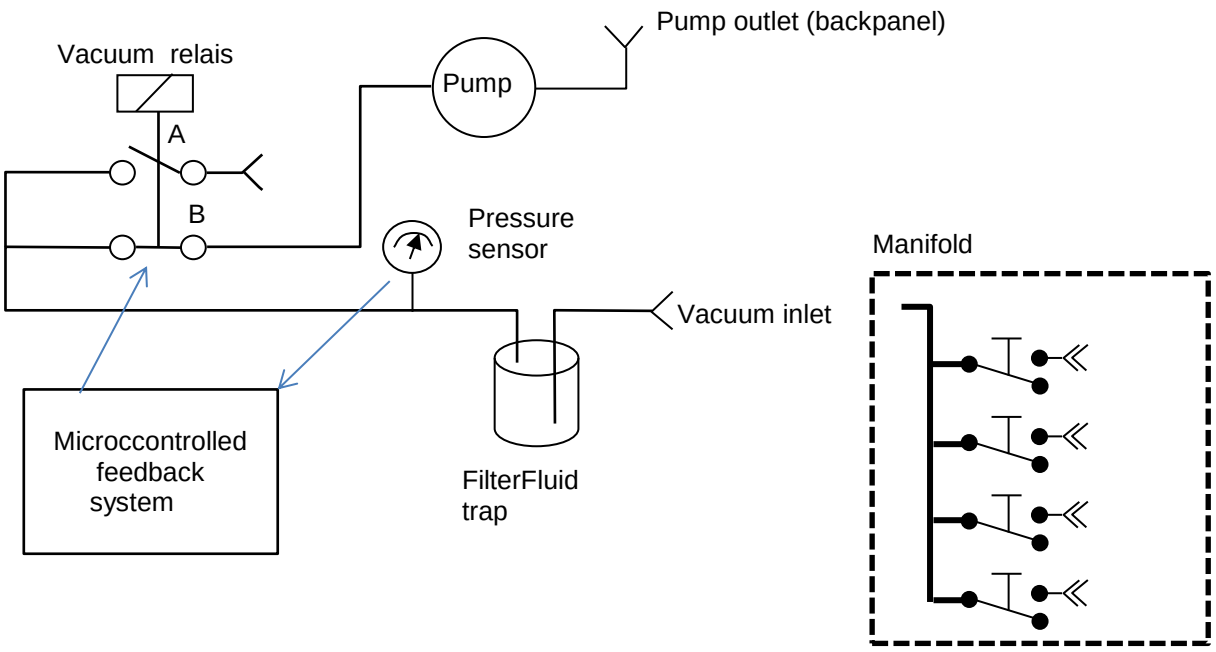
| nifold | | | |
|---|---|---|---|
| Item | Part number | Description | Remark |
| | 28T4101 | Valve | |
| | 28T4145 | T-Piece 4,0x2,5mm hose | |
| | 28T4503 | Hose connector | |
| | 28T4154 | Adapter piece 4mm hose to 3/8” |  |
| | 28T4153 | Nut 3/8” | |
| | 24T0049 | Tubing 4mm x 2,5mm PU Blue | |

## 12 Connection Diagram

Printed Circuid Board 06T0523



## 13 Principal diagram



## 14 Trouble shooting

**Vacuum readout doesn't drop whilst pressing "down" few times.**

The system uses feedback, and the value on the display is the measured pressure. Though the vacuum set points drops, the system maintains its vacuum. After a certain difference the vacuum relais opens, thus dropping the vacuum.

Try to set the vacuum upwards. Lower the vacuum under the set point and use the up button to reach the desired set point.

**After calibration the displayed vacuum value doesn't seem to be correct**

Vacuum can be displayed in:
mmHg
mBar
hPa
PSI

Recheck the calibration of device. The dimension of the device must be the same dimension which is displayed on the TVS.

During calibration zero or span value is not stored

Press enter to store the zero, span or dimension into the microcontroller memory

The value to calibrate the span is too low. When calibrating at 100 mmHg and operating the system at 300 mmHg be higher than the set point used for measuring

Before calibrating start the pump and select maximum vacuum. Press enter and than start the calibration procedure

**Pump doesn't reach vacuum**

When the system is not closed a vacuum can not be build up.

Check the system for leakage. Tubing must be tight and well connected. Valves from manifold must be closed.

**Vacuum value decreases, than settles**

When the motor is turned on the vacuum probably didn't build up due to an open system (toggle switch not closed). The feedback systems tries to increase the vacuum. When the system closes, the feedback overshoots. After a short period the vacuum drops and settles at a stable value.

When starting the pump the system must be closed.

**Pump motor doesn't start**

System still under vacuum.

Open and close a valve on the manifold.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## 15 Calibration details

Date of calibration

Serial number

Performed by

Readout TVS [mBar/hPa]

Readout reference [mBar/hPa]

Reference standard:

| Pressure sensor | |
|---|---|
| **Type** | GHM Pressure sensor SL-01R |
| **Serial** | 14026635 |
| **Range** | -1000 .. 1500mbar |
| **Reader** | serial 37200058 |
| **Certificate** | 24693 - 12-07-2015 by Deutsche Kalibrier Dienst (DKD), Traceable to national standards |

## 16 CE Declaration

Manufacturer: **Tamson Instruments BV**
van 't Hoffstraat 12
2665 JL Bleiswijk
The Netherlands

Product: Vacuum system

Model: TVS (Tamson Vacuum System)

The products to which this statement relates, is manufactured and dully carried out in compliance with the provisions of Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

The products are in conformity with the following specification:

| | |
|---|---|
| Conducted emission | - EN55016-2-1 + EN61326+A1 |
| Radiated emission | - EN55016-2-3 + EN61326+A1+A2+A3 |
| Harmonics | - EN61000-3-2 |
| ESD: | - EN61326 +A1+A2+A3 and EN61000-4-2 +A1+A2 |
| Radiated immunity | - EN61000-4-3 +A1 |
| Electrical Fast Transients | - EN61000-4-4+A1+A2 |
| Surges | - EN61000-4-5+A1 |
| Conducted immunity | - EN 61000-4-6+A1 |
| Voltage dips and Voltage variations | - EN61000-4-11 +A1 |

July 2012, Tamson Instruments bv, The Netherlands

Ing. R.C. van Hall
Director

## 17 Disclaimer

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**We expressly disclaim all warranties of every kind and nature, including warranties of merchantability and fitness for a particular purpose in respect to the use or suitability of the product.**

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